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கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2022(2023)
General Certificate of Education (Ord. Level) Examination, 2022(2023)

විද්‍යාව I
விஞ்ஞானம் I
Science I

පැය එකයි
ஒரு மணித்தியாலம்
One hour

Note :

- *Answer **all** questions.*
- *In each of the questions* 1 *to* 40, *pick one of the alternatives* (1), (2), (3), (4) *which you consider is **correct** or **most appropriate**.*
- ***Mark a cross (X) on the number corresponding to your choice in the answer sheet provided.***
- *Further instructions are given on the back of the answer sheet. Follow them carefully.*

1. What is the organ that mainly performs nitrogenous excretion of human?
(1) kidneys (2) lungs (3) skin (4) liver

2. The unit of pressure is,
(1) $N\ m^{-1}$. (2) $N\ m^{-2}$. (3) N m . (4) $N\ m^{2}$.

3. What is the type of biomolecules in which hydrogen and oxygen atoms are combined in the ratio of 2 : 1?
(1) carbohydrates (2) lipids (3) proteins (4) nucleic acids

4. Select the correct statement given about atoms.
(1) The nucleus of all the atoms of every element contains neutrons.
(2) In every atom, the number of neutrons and the number of protons in the nucleus are equal.
(3) The atomic numbers of two atoms of different elements can be equal.
(4) There may be atoms with different mass numbers in the same element.

5. Of the following plant tissues, which is a complex, permanent tissue?
(1) parenchyma (2) collenchyma (3) sclerenchyma (4) xylem

6. What is the particle that contributes to the flow of an electric current through a metallic conductor?
(1) electron (2) proton (3) neutron (4) metal ion

- Questions **7** and **8** are based on the following chemical equation.

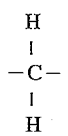
$$M(s) + ZnSO_4(aq) \longrightarrow MSO_4\ (aq) + Zn(s)$$

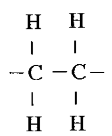
7. In the above chemical equation, the metal indicated as M could be,
(1) Cu. (2) Fe. (3) Mg. (4) Pb.

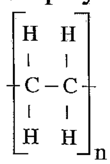
8. What is the type of reaction to which the above chemical equation belongs?
(1) combination (2) decomposition (3) single displacement (4) double displacement

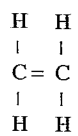
9. The kingdoms to which only heterotrophs belong are,
(1) fungi and protista. (2) protista and plantae.
(3) plantae and animalia. (4) fungi and animalia.

10. Of the following structures, select the repeating unit of polythene.

(1) 

(2) 

(3) 

(4) 

[See page two

11. Which is the phenomenon that **cannot** be explained by total internal reflection?
(1) travelling of light through optical fibres
(2) making diamond shiny by cutting and polishing
(3) formation of a rainbow by dispersion of white light into colours
(4) turning a ray of light by 90° by a rectangular prism

12. Which of the following is a change that occurs after the process of fertilization of a flower?
(1) ovary turning into the pericarp
(2) ovules turning into seeds
(3) sepals turning into the seed coat
(4) integument turning into the pericarp

13. Which of the following is **not** a characteristic of the smooth muscle tissue?
(1) cells being uninucleate
(2) having cross striations
(3) cells are spindle shaped
(4) acting involuntarily

14. Consider the following statements given about mechanical waves.
A - The frequency of the wave changes on entering from one medium into another.
B - The speed of the wave does not depend on its frequency.
C - The speed of the wave depends on the medium through which it travels.
Of the above, true statement/s is/are,
(1) only *A*. (2) only *B*. (3) only *A* and *C*. (4) only *B* and *C*.

15. Given below are some information regarding a certain element.
- It comes second in the order of abundance of elements in the Earth's crust.
- Shows semi-conductor properties.
- Shows metallic properties as well as non- metallic properties.

This element is,
(1) aluminium. (2) silicon. (3) boron. (4) phosphorus.

16. A group of students counted the number of animals in a unit area of an ecosystem. Those numbers are given below.

Animal species	butterfly	spider	snail	earthworm	leech	centipede	gecko
Number	2	1	3	1	2	1	1

What is the number of animals belonging to phylum Annelida in the relevant area?
(1) 1 (2) 3 (3) 4 (4) 6

17. Of the following compounds, what is the compound in which the percentage of oxygen by mass is 50%?
(H = 1, C = 12, N = 14, O = 16, Mg = 24, Ca = 40)
(1) NH_4OH (2) $Ca(OH)_2$ (3) CH_3OH (4) $MgCO_3$

18. What is the advantage of using the handle fixed to a door in the occasions of opening and closing it?
(1) adequacy of applying a low moment of force
(2) being able to execute a greater rotation
(3) adequacy of applying a smaller force
(4) reduction of the amount of work done

19. In the male reproductive system, sperms are produced in the,
(1) testes. (2) penis. (3) prostrate gland. (4) seminal vesicles.

20. What is the statement that is true with respect to all the molecules given below?
CO_2, NH_3, H_2O
(1) The electron octet of the central atom of the molecules is complete.
(2) Only single bonds occur among the atoms of the molecules.
(3) Lone pairs of electrons are present on the central atom of the molecules.
(4) The molecules exist only as gases at room temperature.

21. Consider the following statements given about heat transfer.
A - Sea breeze and land breeze occur due to conduction.
B - Heat reaches the Earth from the Sun by radiation.
C - When a metal spoon is put into a hot cup of tea it is heated by convection.
Of the above, true statement/s is/are,
(1) only *A*. (2) only *B*. (3) only *A* and *C*. (4) only *B* and *C*.

[*See page three*

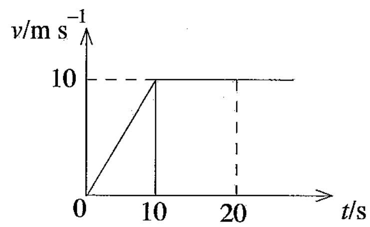
22. A function of the hormone adrenaline is,
(1) preparing body to respond in emergencies.
(2) controlling the rate of metabolic activities in the body.
(3) stimulating the growth of bones.
(4) stimulating the spermatogenesis of males.

23. What is the amount of moles of O_2 in 64 g of oxygen? (O = 16)
(1) 1 (2) 2 (3) 3 (4) 4

24. In a transformer, the voltage supplied to the primary coil is 120 V while the voltage received from the secondary coil is 12 V. If the current flowing through the primary coil is 2 A, what is the current flowing through the secondary coil?
(1) 0.2 A (2) 2 A (3) 10 A (4) 20 A

25. Consider the following statements given with regard to anaerobic respiration.
A - Lactic acid is produced during the anaerobic respiration taking place in animal cells.
B - The amount of energy produced in anaerobic respiration is higher than that in aerobic respiration.
C - A part of energy produced during anaerobic respiration is stored as ATP.
Of the above, the true statements are,
(1) only *A* and *B*. (2) only *A* and *C*. (3) only *B* and *C*. (4) all *A*, *B* and *C*.

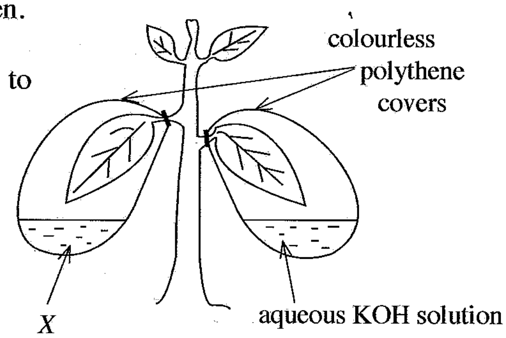
26. Indicated here is the velocity-time graph for the motion of a certain object. What is the displacement of the object from the beginning to 20 s?
(1) 50 m (2) 100 m
(3) 150 m (4) 200 m



27. Consider the following statements.
A - In chemical industries, catalysts are used to obtain a higher yield in a shorter period of time.
B - Catalysts increase as well as decrease the rate of chemical reactions.
Of the above statements,
(1) both *A* and *B* are true. (2) *A* is true while *B* is false.
(3) both *A* and *B* are false. (4) *A* is false while *B* is true.

28. Which of the following phenomena agrees most with Newton's third law of motion?
(1) A ball falling down from a higher level bouncing after touching the ground.
(2) The velocity of a fruit falling from a tree reaching the maximum value when it comes closer to the ground.
(3) Flinging of passengers forward when brakes are suddenly applied to a running bus.
(4) Changing the direction of a moving football by kicking it.

- Questions **29** and **30** below are based on the figure given.



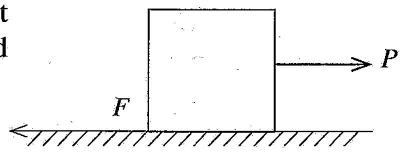
29. The need of which factor for photosynthesis is expected to be tested by this set up?
(1) water (2) light
(3) chlorophyll (4) carbon dioxide

30. What is the substance labelled *X* in the above figure?
(1) water (2) lime water
(3) iodine solution (4) ethyl alcohol

31. What is the mass of $C_6H_{12}O_6$ required to prepare 1 dm^3 of a 0.1 mol dm^{-3} glucose solution?
(H = 1, C = 12, O = 16)
(1) 0.18 g (2) 1.8 g (3) 18 g (4) 180 g

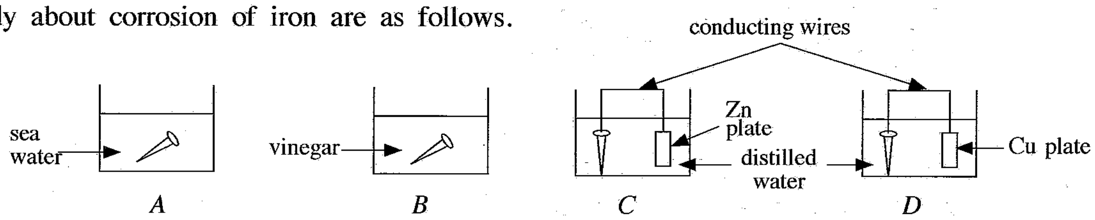
[See page four

32. The figure shows how a horizontal force P is applied on an object placed on a plane. When the value of P is gradually increased from zero, the frictional force (F) acting on the object,



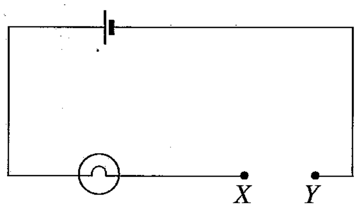
(1) takes a constant value continuously from the beginning.
(2) increases gradually from zero to a maximum value.
(3) increases gradually from zero to a maximum value and then decreases gradually.
(4) increases gradually from zero to a maximum value, then decreases slightly and takes a constant value.

33. Arrangements A, B, C and D set up by a student in the laboratory using four clean, iron nails to study about corrosion of iron are as follows.



When observed after a few days, the nail in which arrangement has corroded least?
(1) A (2) B (3) C (4) D

34. By connecting a conducting wire between X and Y in the circuit shown in the figure, the bulb in it can be lighted. In three instances, three wires made of the same metal were connected between X and Y as given below and the brightness of the bulb was measured.



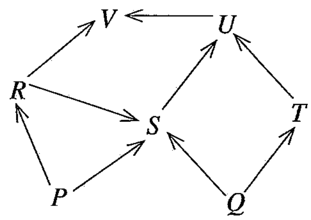
A - connecting a thin long wire
B - connecting a thick short wire
C - connecting a thin short wire

Accordingly, what is the order in which the brightness of the bulb **increases**?
(1) A , B , C (2) A , C , B (3) B , A , C (4) C , B , A

35. In a water barometer, the vertical height of the water column is 10 m. What is the atmospheric pressure at that instant? (Density of water = 1000 kg m^{-3}, Acceleration due to gravity = 10 m s^{-2})
(1) 1.0×10^2 Pa (2) 1.0×10^3 Pa (3) 1.0×10^4 Pa (4) 1.0×10^5 Pa

36. What is the chemical compound that ionises completely in aqueous solution and releases H^+ ions?
(1) CH_3COOH (2) H_3PO_4 (3) H_2CO_3 (4) HNO_3

37. A food web that can be seen in a terrestrial ecosystem is shown in the figure. What is the **most correct** inference that can be made based on this food web?



(1) R is a herbivore. (2) U is a carnivore.
(3) S is an ominivore. (4) V is an ominivore.

38. Of the following, which option indicates the courses of action relevant to sustainable use of resources and use of renewable energy resources respectively?
(1) waste management and production of electricity by wind power
(2) reforestation and production of electricity by coal
(3) converting marshlands into cultivable lands and production of electricity by solar energy
(4) minimizing food mile and production of electricity by mineral oil

39. Which option indicates the chemical species affecting the environmental crises, ozone layer depletion, acid rains and eutrophication respectively?
(1) CFC, NO_2, CO_3^{2-} (2) CFC, SO_2, NO_3^- (3) NO_2, CO_2, PO_4^{3-} (4) NO, SO_2, SO_4^{2-}

40. Select the pair with inversely proportional relationship.
(1) concentration of greenhouse gases - atmospheric temperature
(2) food mile - carbon footprint
(3) deforestation - desertification
(4) emergence of invasive species - biodiversity

* * *

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இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

34 E II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2022(2023)
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2022(2023)
General Certificate of Education (Ord. Level) Examination, 2022(2023)

විද්‍යාව II
விஞ்ஞானம் II
Science II

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

අමතර කියවීම් කාලය - මිනිත්තු 10 යි
மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
Additional Reading Time - 10 minutes

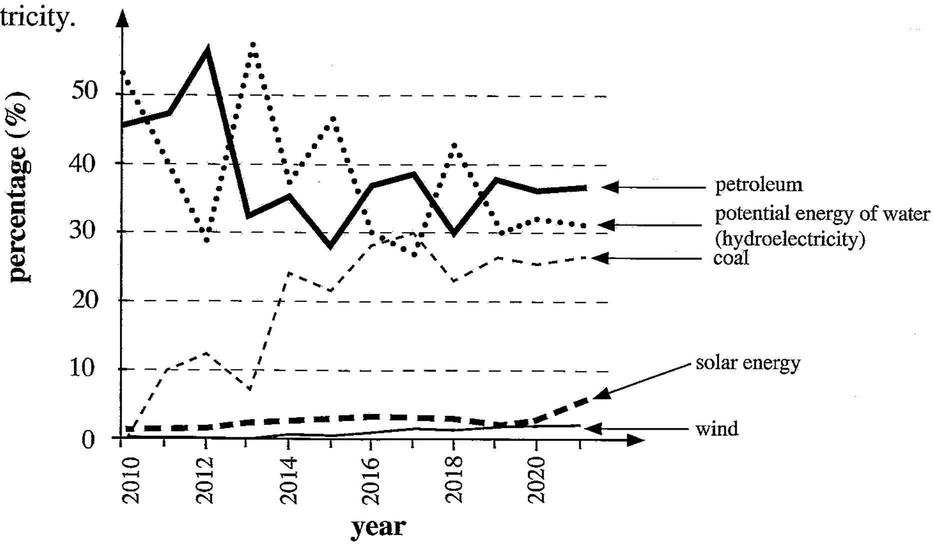
Use additional reading time to go through the question paper, select the questions you will answer and decide which of them you will prioritise.

Index Number: ....

Instructions:
- ***Write your answers in neat handwriting.***
- *Answer the* ***four*** *questions in* **Part A***, in the space provided.*
- *Of the five questions in* **Part B** *answer* ***three*** *questions only.*
- ***After answering, tie* Part A *and the answer script of* Part B *together and hand over.***

Part A

1. (*A*) The following graph indicates how a developing country utilized various sources of energy for generating electricity.



Based on the information in the above graph, fill in the blanks in the following table.

	Statement	Answer
(i)	The year in which the potential energy of water has been utilized at the highest percentage	....
(ii)	The renewable energy source utilized least	....
(iii)	The energy source of which the utilization has increased rapidly during the time range given	....
(iv)	The utilization of petroleum in the year 2018 as a percentage	....

(v) According to the above graph, what is the relationship that can be seen in the variation between the utilization of petroleum and utilization of potential energy of water to generate electricity?
....

(vi) In the future, which energy source indicated here should be paid greater attention for generating electricity in a torrid zone country like Sri Lanka? ....
....

(vii) Name a source of energy which is **not** included in this graph but is used in some developed countries to generate electricity. ....

[*See page two*

(*B*) A diagram of a biogeochemical cycle is given here.

(i) What is the biogeochemical cycle illustrated by this diagram? ....

(ii) Name the processes indicated by the letters *P* and *Q*.

P = ... *Q* = ...

(iii) Name a substance indicated by the letter *A*.

....

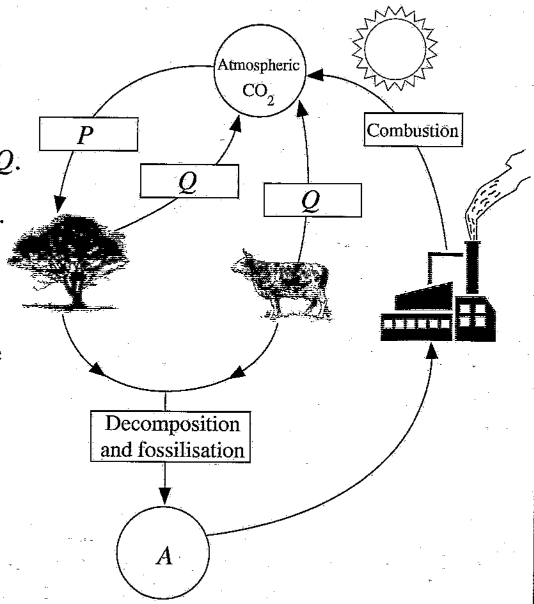
(iv) What process indicated here occurs with the contribution of micro-organisms? ....

(v) (a) What is the environmental crisis caused by the atmospheric CO_2 concentration exceeding the optimum level?

....

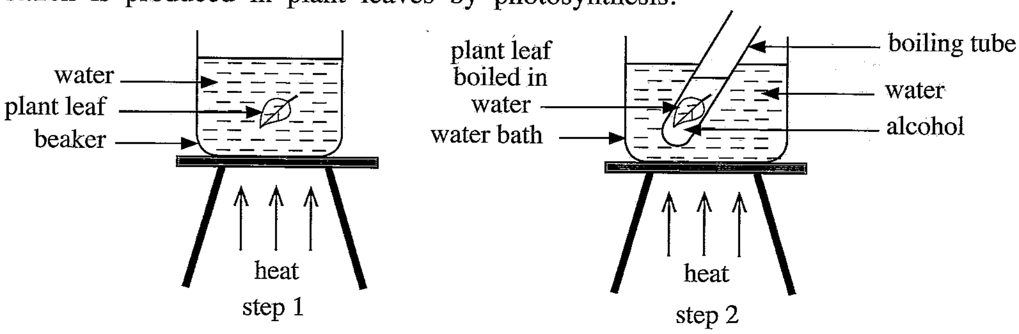
(b) State an unfavourable effect brought about by that crisis. ....

....



15

2. (*A*) The sketch given below indicates two steps of an experiment conducted to investigate whether starch is produced in plant leaves by photosynthesis.



(i) Write the reason for each of the following.

(a) boiling the plant leaf in water in step 1 : ....

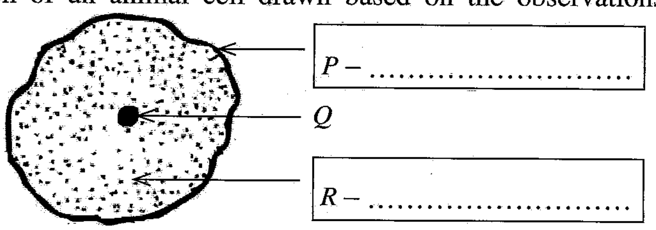
(b) boiling the plant leaf in alcohol in step 2 : ....

(c) using a water bath in step 2 : ....

(ii) During step 2, what colour change can be seen in alcohol in the boiling tube?

....

(*B*) Given below is a sketch of an animal cell drawn based on the observations made under a light microscope.



(i) Write in relevant boxes the names of the structures labelled *P* and *R*.

(ii) State the function of *P*.

....

(iii) Name a type of animal cell which does not contain the organelle *Q*. ....

(iv) What is the structure which is absent in an animal cell but is present in every plant cell?

....

(*C*) (i) The sex chromosomes contained in an egg mother cell and a sperm mother cell are indicated as (XX) and (XY) respectively.
Accordingly, fill in the boxes *a*, *b*, *c*, *d*, *e* and *f* in the Punnett square given below.

♂ – Male gamete
♀ – Female gamete

♂ \ ♀	*X*	(*a*) ....
(*b*)	(*c*)	(*d*) ....
Y	(*e*)	(*f*) ....

(ii) State a genetic disorder caused by sex-linked inheritance. ....
.... 15

3. (*A*) Figures 1 and 2 indicate Lewis dot-and-cross structures of two molecules formed by the atoms belonging to three elements *X*, *Y* and *Z*. *X*, *Y* and *Z* are not their standard symbols. The atomic numbers of *X* and *Y* are less than 10. The atomic number of *Z* is higher than 10 and lower than 20.

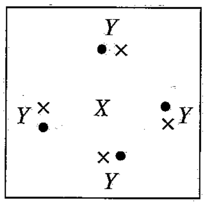


Figure 1

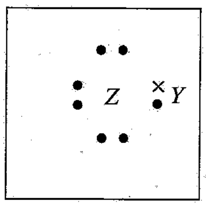


Figure 2

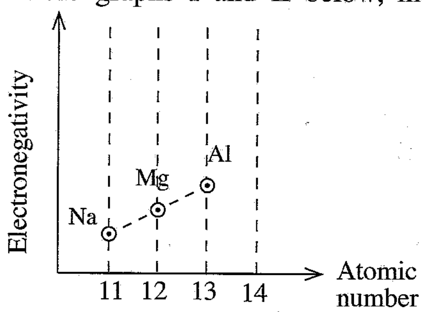
Write the answers relevant to the following blanks.

(i) The atomic number of *X* : ....
(ii) The period to which *X* belongs in the periodic table : ....
(iii) The group to which *Z* belongs in the periodic table : ....
(iv) The molecular formula of the compound formed by the combination of *X* and *Z* : ....
(v) The type of chemical bonds existing between the atoms of *X* and *Y* : ....
(vi) The type of chemical bonds existing between the atoms of *Z* and *Y* : ....
(vii) The chemical formula of element *Z* when it exists in the free state : ....

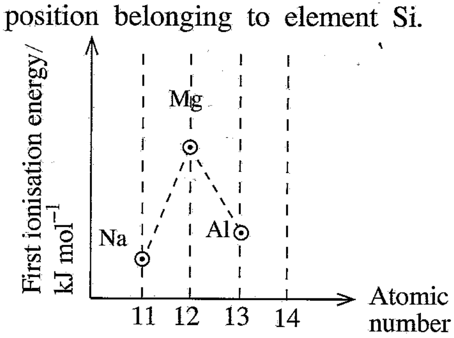
(*B*) The elements in the third period of the periodic table are given below with their atomic numbers.

Element	Na	Mg	Al	Si	P	S	Cl	Ar
Atomic number	11	12	13	14	15	16	17	18

(i) In the graphs I and II below, mark as ⊙, the position belonging to element Si.



Graph I



Graph II

(ii) Of the elements in the third period, select the element fitting each of the following statements and write its chemical symbol in the blank.

(a) The element forming a chloride with M^{2+} ions : ....
(b) The element forming an amphoteric oxide : ....
(c) The element existing as a monatomic gas : ....

[See page four

(iii) (a) Which element in the third period reacts fast with cold water?

....

(b) How do you confirm that a basic solution is formed after the above reaction?

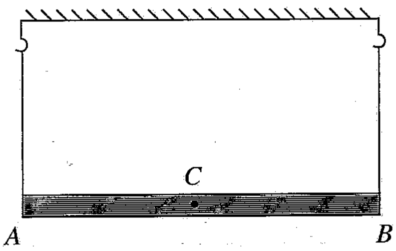
....

(iv) Given below is an incomplete chemical equation for the reaction between magnesium metal and steam. Fill in the blanks in it.

$Mg(s) + H_2O\,(...) \longrightarrow ....(s) + H_2(g)$

15

4. (*A*) The figure indicates how a uniform rod *AB* whose mid point is *C*, is suspended in the ceiling by two strings tied to its two ends and kept in equilibrium.



(i) Using arrow heads, mark the following forces in the figure.

(a) the tensions T_1 and T_2 exerted by the two strings on the rod

(b) the weight of the rod W

(ii) What is the relationship existing between T_1 and T_2? ....

(iii) Write by an equation, the relationship among T_1, T_2 and W.

....

(iv) If the mass of the above rod is 200 g,

(a) what is the value of W in Newtons? (g = 10 m s^{-2}) W = ...

(b) indicate the values of T_1 and T_2 in Newtons. T_1 = ... T_2 = ...

(*B*) Figure 1 below illustrates a helical spring connected to an immovable support on a table. The other end of the spring is in contact with a block of wood. Figure 2 below shows how the spring is compressed by applying a horizontal force *P* on the block of wood. Assume that there is no friction between the block of wood and the surface of the table.

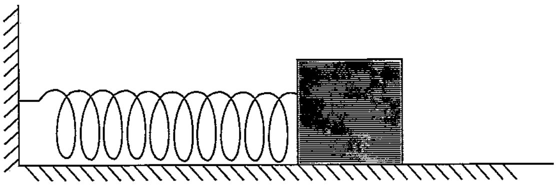


Figure 1

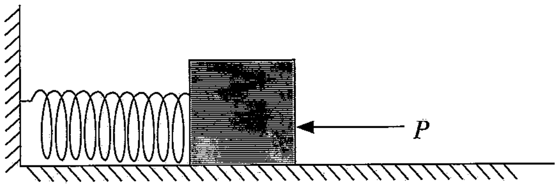


Figure 2

(i) Name the form of energy stored in the compressed spring.

....

(ii) (a) To what form of energy will the form of energy stated in (i) above be transformed when the force *P* is removed?

....

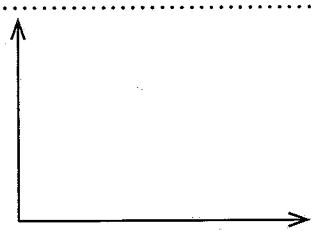
(b) If the amount of energy stored in the compressed spring is 16 J and the mass of the block of wood is 0.5 kg, calculate the initial velocity of the block of wood.

....

(c) State the nature of motion of the block of wood along the table after it is released from the spring.

....

(d) **If there was a constant friction** between the surface of the table and the block of wood and if the table had a considerable length, draw the velocity-time graph for the expected motion of the block of wood after it has been released from the spring.

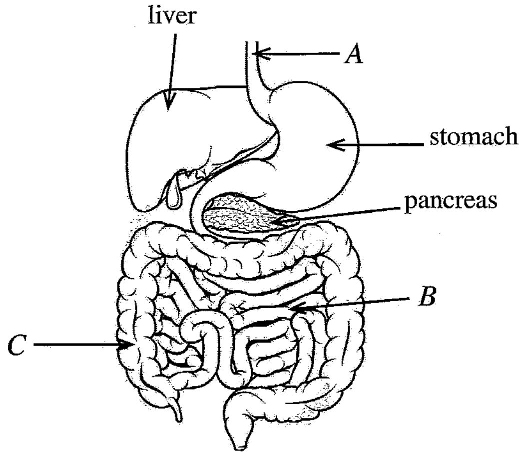


15

Part B

- Answer only **three** questions from the questions No. **5, 6, 7, 8** and **9**.

5. (*A*) Given below is a sketch of the human digestive system.



(i) Name the parts *A*, *B* and *C*.

(ii) What is the function of the bile produced in the liver in the process of food digestion?

(iii) What is the protein digestive enzyme contained in pancreatic juice?

(iv) State **three** adaptations in structure *B* to absorb digested end products of food to blood efficiently.

(v) What is the function performed by *C*?

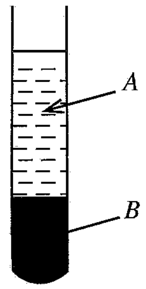
(vi) Inflammation of inner lining of mucosa of stomach is a common disease. What is the name of that disease?

(*B*) Blood is a specialized connective tissue.

(i) State **one** function of connective tissues.

(ii) A main feature seen in other connective tissues is not seen in the blood tissue. What is this feature?

(iii) When blood is centrifuged, it separates into two parts as shown in the diagram.



(a) In this, by what name is part *A* known?

(b) By what name are the nucleated, irregular cells contained in part *B* commonly known?

(c) State a function performed by the cells you mentioned in (b) above.

(*C*) Two systems in the human body operate to maintain coordination and homeostasis. One of them is the nervous system.

(i) What is the other system relevant to the maintenance of coordination and homeostasis?

(ii) State briefly the meaning of homeostasis.

(iii) What is the structural unit of the nervous system?

(iv) In a reflex action, the pathway taken by the impulses is called the reflex arc. State in the form of a flow chart, the reflex arc from the receptor to the effector in sequential order.

(20 marks)

[See page six

6. (*A*) At present light automobiles are run mainly by burning fossil fuels such as petrol (gasoline). The hydrocarbon octane (C_8H_{18}) is the main component contained in petrol.

(i) Explain briefly what hydrocarbons are.

(ii) (a) Based on the common formula of alkanes, verify that octane is an alkane.

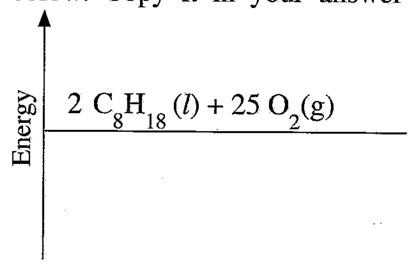
(b) Name a hydrocarbon that belongs to the alkane series and exists in the gaseous state at room temperature.

(iii) The balanced chemical equation relevant to the complete combustion of octane is given below.

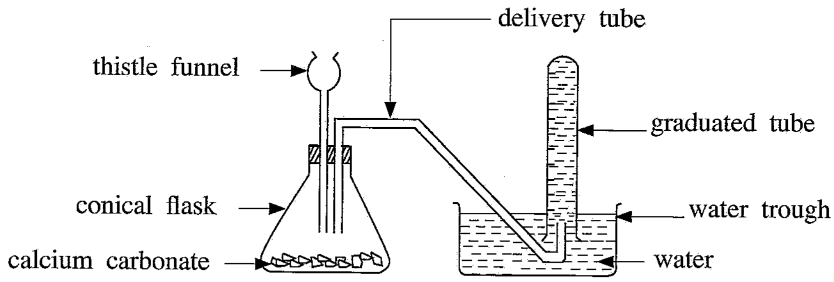
$$2\ C_8H_{18}\ (l) + 25\ O_2(g) \longrightarrow 16\ CO_2(g) + 18\ H_2O\ (l)$$

(a) Calculate the mass of carbon dioxide released to the environment by complete combustion of one mole of octane (Relative Molecular Mass of CO_2 = 44).

(b) An incomplete energy level diagram relating to complete combustion of octane is given below. Copy it in your answer script and complete.



(*B*) An apparatus set up by a student to collect a specifically measured volume of carbon dioxide gas using the method of downward displacement of water is given below.



Dilute hydrochloric acid is allowed to drip on the pieces of calcium carbonate through the thistle funnel and carbon dioxide gas is produced by the reaction between those two.

(i) What change should be made in this set up to prevent the escape of the gas produced through the thistle funnel?

(ii) What is the advantage of using a small conical flask rather than a large conical flask here?

(iii) Write the balanced chemical equation indicating the reaction between calcium carbonate and hydrochloric acid.

(iv) If an equal mass of powdered calcium carbonate was used instead of pieces of calcium carbonate, required volume of the gas can be collected in a shorter period of time. Explain briefly the reason for this.

(v) (a) Name another method for collecting carbon dioxide gas when the measurement of the volume of the gas is **not** required.

(b) What physical property of carbon dioxide gas is made use of in the method you stated in part (a) above?

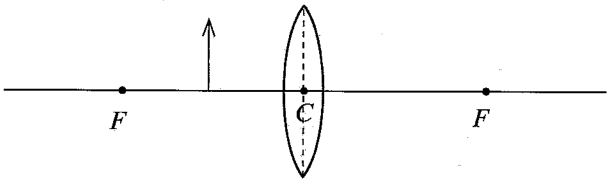
(vi) State a test that can be used in the school laboratory to identify carbon dioxide gas and the observations of it.

(vii) State an instance where non-combustible property of carbon dioxide is made use of.

(20 marks)

[*See page seven*

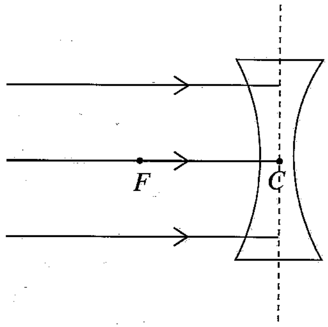
7. (*A*) The following diagram illustrates how an object is placed between the optical centre and the focus of a glass convex lens.



(i) (a) Copy this diagram in your answer script and draw a ray diagram to construct the image formed.

(b) State **two** characteristics of that image.

(ii) (a) Copy the given diagram in your answer script and complete the ray diagram.



(b) Whatever is the distance of placing an object in front of a concave lens, the image that can be seen has the same characteristics. State **two** characteristics of that image.

(*B*) (i) Assume that you are provided with four resistors, each with a resistance of 2 Ω.

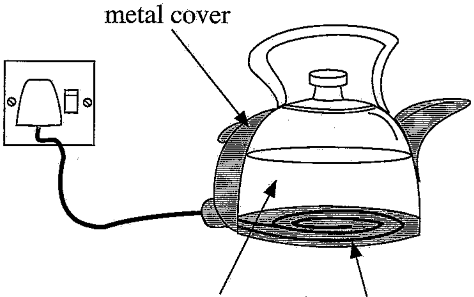
(a) Draw a diagram indicating, how those can be connected to obtain the highest equivalent resistance.

(b) What is the name used to identify the way the resistors are connected as mentioned above?

(c) What is the equivalent resistance of that arrangement of resistors?

(d) If this arrangement of resistors was connected to a battery with an electromotive force of 8 V, what is the current flowing through the circuit?

(*C*) The diagram shows a kettle with a heating coil. The kettle contains 1 kg of water.



(i) What is the main method of transmission of heat produced by the heating coil throughout the entire mass of water?

(ii) Calculate the amount of heat received by water when water in the kettle was heated from 25 °C to 50 °C. (Specific heat capacity of water = 4200 J kg^{-1} $°C^{-1}$)

(iii) State **two** properties which a metal used to make the heating coil should necessarily have.

(iv) When using this kind of a kettle, using a three pin plug is a must. State the reason for it.

(20 marks)

8. (*A*) A study was conducted by a student on the home garden and the outer environment of his home situated in a rural area. Answer the following questions related to the phenomena identified by him therein.

(i) Both the papaw plants in the garden had produced flowers. But, of the two plants, always only one plant produced fruits. Explain the reason for this.

(ii) Though the jasmine plant grown in the garden produces many flowers, those flowers do not produce fruits. Hence, state an artificial vegetative propagation method that could be adopted to obtain a new sapling from a jasmine plant.

(iii) It was observed that the stamens of the flowers of a *Clerodendrum paniculatum* (pinna/ pagoda plant) plant in the garden are turned away from the stigma. What is the importance of that adaptation?

(iv) When a small animal staying on a plant leaf was observed by a hand lens, jointed appendages and a segmented body could be seen. Name the phylum to which that animal belongs.

(v) In a fallen plant leaf, the fleshy parts were decayed while the veins were left. A diagram of it is given here.



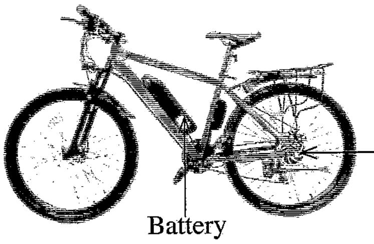
(a) By what name is this venation known?

(b) Describe briefly the nature of the root system of the plant with these leaves.

[See page eight

(vi) It was observed that an animal with four limbs staying on a decayed log had a moist skin without scales. What is the class of vertebrates to which this animal belongs?

(*B*) The diagram illustrates an improved bicycle. It is constructed in such a way that it can be pedalled by a man as well as run by an electric motor.



(i) (a) Write the transformation of energy that occurs when a man pedals the bicycle.

(b) Write the transformation of energy that occurs when the bicycle is run by the motor.

(ii) (a) The voltage supplied to the motor by the battery is 50 V while the maximum power of the motor is 250 W. What is the current drawn from the battery when the motor operates with this power?

(b) The capacity of the battery is indicated as 10 A h (10 Ampere hours). This means that the battery gets fully discharged in one hour when a current of 10 A is drawn from it. When the current calculated in (a) above is drawn, what time is taken by the battery to discharge completely?

(c) Find the total distance that can be travelled if the bicycle is to run only by the motor at a constant speed of 30 km h^{-1}, at its maximum power, until the fully charged battery becomes completely discharged.

(iii) Suggest two eco-friendly methods that could be used to charge the battery of this bicycle without using the national electricity grid. (20 marks)

9. (*A*) Extraction of common salt (sodium chloride) from sea water is a chemical industry carried out in Sri Lanka.

(i) State **two** environmental factors that should be present in a location suitable to install a saltern.

(ii) Name the **two** separating techniques relating to the extraction of salt from sea water.

(iii) Salt taken out from the saltern is heaped as prismatic piles and kept for about six months. What is the reason for this?

(iv) Some countries in the world obtain drinking water by simple distillation of sea water. Draw a labelled sketch of an apparatus suitable to demonstrate that separating technique in the school laboratory.

(v) During the electrolysis of acidulated water, it was observed that gas bubbles liberate at the electrodes.

(a) At which electrode is a greater volume of gas evolved here?

(b) What is the gas evolved at that electrode?

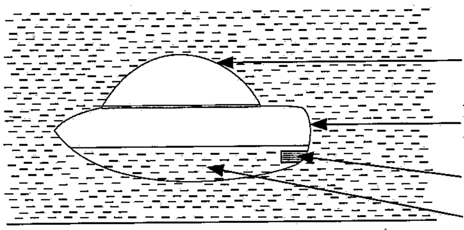
(*B*) (i) Write Archimedes' principle.

(ii) When a rubber ball pressed to the bottom of a reservoir with water at rest was released, it could be observed that the ball moved to the surface of water.

(a) Action of which force on the ball is the reason for the above observation?

(b) State **two** factors on which the magnitude of the force you mentioned above depends.

(iii) The figure illustrates an equipment with a gas chamber and a tank to which water can be filled. Using the device *P*, water can be filled into and removed from the tank. The figure shows how it stays floating in water when water is filled to a certain volume of the tank.



(a) Based on the forces acting on the equipment, explain the reason why the equipment stays floating in water.

(b) What change in the position of the equipment will occur if an extra amount of water is added to the tank?

(c) In terms of the forces acting on the equipment, explain the reason for the change you stated in (b).

(d) Name a craft that has been created to travel on the surface of water and inside water using an arrangement such as the one given above. (20 marks)

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